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Werner Heierli

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Examiner Name

Jeanette E. Chapman

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Fee Attached

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Amendment/Reply

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After Final

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Affidavits/declaration(s)

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Extension of Time Request

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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application of

Applicant : Werner Heierli
Serial No. : 10/657,375
Filed : September 8, 2003
Title : HYBRID ARCHED OVERFILLED STRUCTURE
Docket : 027262-182-D1
Examiner : Chapman, Jeanette E.
Art Unit : 3635

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P.O. Box 1450
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Sir:

BRIEF ON APPEAL

This is an appeal from the Final Rejection mailed on June 23, 2005. A Notice of Appeal was submitted on October 24, 2005.

(1) Real Party in Interest

This application is assigned to BEBOTech Corporation, as evidenced by the Assignment recorded on June 12, 2003 at Reel/Frame 015661/0077. Accordingly, BEBOTech Corporation is the real party in interest.

(2) Related Appeals and Interferences

The inventors, assignee and undersigned attorney are not aware of any appeals or interferences that would directly affect, be directly affected by, or have a bearing on the Board's decision in this appeal.

(3) Status of Claims

Claims 25-51 and 66-69 are pending. Claims 25, 27-30, 34-41¹, 45-47 and 66-68 are rejected and claims 26, 31-33, 42-44, 48 and 49 are objected to. Claims 50, 51 and 69 are allowed.² The rejections of claims 25, 27-30, 34-41, 45-47 and 66-68 are being appealed.

(4) Status of Amendments

The claims were amended subsequent to final rejection by the amendment and response after final filed July 28, 2005. As indicated by the Advisory Action of August 5, 2005, the amendments were entered.

(5) Summary of the Invention

The invention is an improved method of forming arched overfilled bridge structures. The method is an improvement over known methods of forming reinforced concrete overfilled arches such as by casting the entire arch structure in place or by pre-casting the entire arch structure. Casting the entire arch structure in place often requires formwork on both the inside and the outside of the arch profile as the sides of the arch profile are generally too steep to be cast without such support.³ Pre-casting the complete arch structure can require construction of reusable molds and the transport and lifting of the finished, large arch profiles into their permanent locations.⁴

The present invention improves upon these known methods by combining pre-cast side elements with cast-in-place crown sector elements to form a hybrid arched overfilled bridge structure (Fig. 1).⁵ As can be seen by Fig. 1, the bridge structure 10 includes side elements 50 and crown sector elements 80 extending between the side elements 50. The crown sector elements 80 are exposed to the underlying passageway extending in

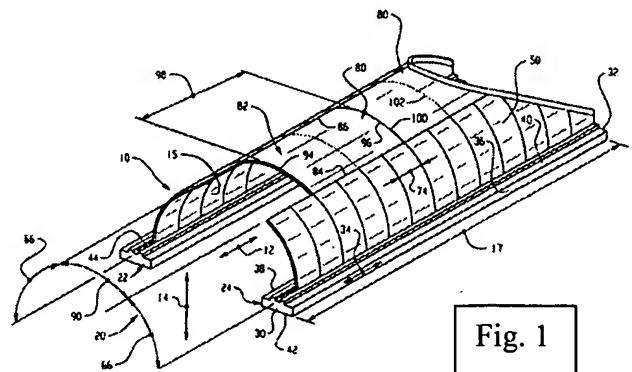


Fig. 1

¹ Claims 35 and 36 depend from allowable claim 26 and as such, Applicant submits that the rejection of claims 35 and 36 is improper.

² All pending claims are attached hereto as an Appendix.

³ Specification, pg. 1, ln. 20-26.

⁴ Specification, pg. 2, ln. 12-16.

⁵ Specification, Fig. 1.

the direction of arrow 12 through the bridge structure 10.

Bridge structure 10 is formed by erecting pre-cast side elements in two rows and casting in place the crown sector elements 80 between the two rows. Claim 25 recites, for example, casting in place a crown sector element between two pre-cast elements to extend from one pre-cast side element of the two pre-cast side elements to the other side element of the two pre-cast side elements. As cast, the cast-in-place crown sector element combines with the two pre-cast side elements to define a bridge over the first pathway and the cast-in-place crown sector elements have a surface that is exposed to the first pathway.

An overall process for forming the bridge structure 10 is illustrated by Fig. 11 and described from pg. 23, ln. 1 to pg. 24 ln. 3. Various apparatus for use in casting-in-place the crown sector elements are shown by Figs. 6-10.

(6) Grounds of Rejection to be Reviewed on Appeal

1. The rejection of claims 25, 37-39, 41, 45, 47, 66 and 68 as being anticipated under 35 U.S.C. §102(b) by Monachino (U.S. Pat. No. 6,408,581).
2. The rejection of claims 25, 29, 66 and 67 as being obvious under 35 U.S.C. §103(a) over Shall et al. (U.S. Pat. No. 6,205,717) in view of Monachino. More particularly, would one of ordinary skill in the art have been motivated by Monachino to modify the process of Shall et al. to cast-in-place the claimed crown sector elements?⁶
3. The rejection of claims 27, 30, 34, 35 and 40 as being obvious under 35 U.S.C. §103(a) over Shall et al. or Monachino in view of Olsen (U.S. Pat. No. 4,639,345).
4. The rejection of claims 28 and 36 as being obvious under 35 U.S.C. §103(a) over Shall et al. or Monachino in view of Olsen and further in view of Mingolla et al. (U.S. Pat. No. 4,271,555).
5. The rejection of claim 46 as being obvious under 35 U.S.C. §103(a) over Shall et al. in view of Monachino in view of Davidson (U.S. Pat. No. 2,372,187).

(7) Argument

⁶ Where art is combined to attain the claims, the combination must achieve the claimed invention, and there must be a suggestion or a motivation in the art to combine the art, as well as an expectation of success for the proposed combination. *In re Vaeck*, 947 F.2d 488, 493, 20 USPQ2d 1438 (Fed. Cir. 1991).

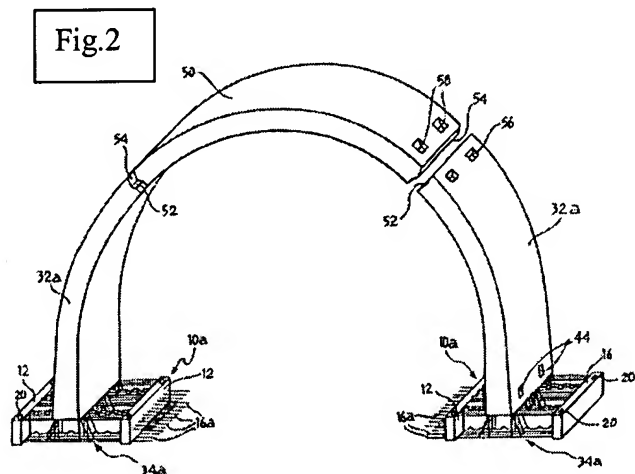
One of ordinary skill in the art is fully aware of the differences between pre-casting a structure such as Monachino's pier 32a and arch element 50, and casting-in-place a structure. For example, pre-casting involves the pouring and curing of the concrete to first form the arch component and the subsequent movement of the cured arch component into its final location in the bridge structure. By contrast, cast-in-place structures are formed *in situ*, forming part of the desired structure without any transport, lifting or other movement of the arch component subsequent to curing. As set forth in the Applicant's reply after final, "casting-in-place" means that the concrete is actually poured at and sets up or cures at the final position.

Argument #1: Claims 25, 37-39, 41, 45, 47 and 66 are not anticipated under 35 U.S.C. §102(b) by Monachino.

Monachino fails to teach the casting-in-place limitation.

Monachino fails to teach "casting-in-place" a crown sector element between two precast side elements as required by step E of claim 25. Likewise, Monachino fails to teach casting-in-place one or more crown sector elements between two spaced apart rows of pre-cast side elements as required at step C of claim 66.

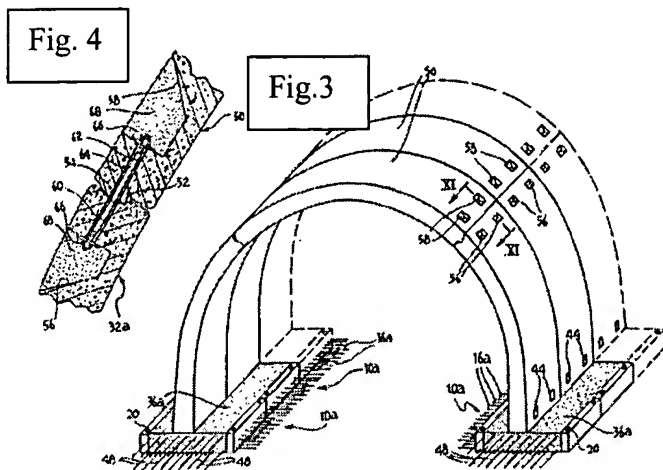
As can clearly be seen by Fig. 2,⁷ Monachino's disclosed arch structure is formed by a pair of pre-cast arch segments 32a and pre-cast arch element 50. As described by Monachino, "[t]he tunnel section is completed by a prefabricated upper element in the form of an arch, generally indicated 50."⁸ To construct the tunnel section of Monachino, the prefabricated arch element 50 is placed on top of the two opposite piers 32a as illustrated by Fig. 3 below.⁹ A tie rod 64 and sealing material 68 are used to clamp and seal the prefabricated arch element 50 in place. See Fig. 4 below.¹⁰



⁷ Monachino, Fig. 9.

⁸ Monachino at col. 7, ln. 30-31 (emphasis added).

⁹ Monachino, Fig. 10.



By contrast, Applicant's claimed method includes casting the crown sector element in place. As previously indicated by Applicant, casting-in-place the crown sector element means that the concrete is actually poured at and sets up or cures at the final position of the crown sector element in the structure. There can be no doubt that elements 30 of Monachino are pre-cast

elements, not cast-in-place elements.

Argument #2: Claim 68 is not anticipated under 35 U.S.C. §102(b) by Monachino.

Moreover, specifically addressing dependent claim 68, such claim requires that "each crown sector element extends along the first pathway for a length that connects multiple pre-cast side elements of each row."¹¹ In contrast, Monachino teaches an arrangement in which each prefabricated arch element 50 has the same length as, and aligns with only a single one of the precast side elements 32a of each row.¹² Claim 68 is distinguishable over Monachino for at least this additional reason.

A claim is anticipated only if each and every element in the claim is found, either expressly or inherently described, in a single prior art reference.¹³ The identical invention must be shown in as complete detail as is contained in the claim.¹⁴ Because Monachino fails to disclose either expressly or inherently casting-in-place a crown sector element between pre-cast side elements as claimed by claims 25 and 66, Applicants respectfully request this rejection be withdrawn.

For at least this reason, withdrawal of the 102 rejection of claims 25 and 66, as well as dependent claims 37-39, 41, 45, 47 and 68 is requested.

¹⁰ Monachino, Fig. 11.

¹¹ Specification, Fig. 1 where each crown sector element 80 has a length in direction 12 that is greater than the length of each side element 50, so as to connect multiple side elements 50 of each row.

¹² Monachino, Fig. 10.

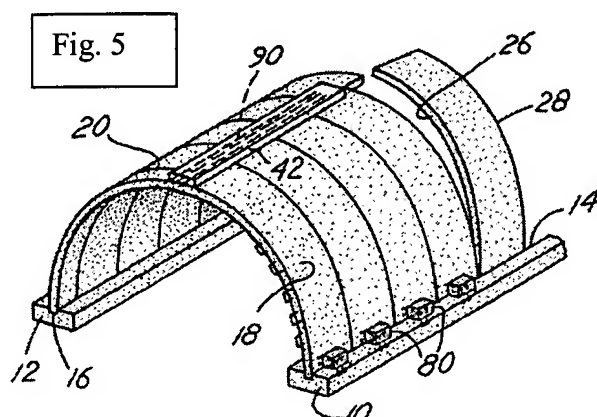
¹³ *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

¹⁴ *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Argument #3: Claims 25, 29, 66 and 67 are not obvious under 35 U.S.C. §103(a) over Shall et al. in view of Monachino.

(a) *The Examiner's combination of these two references fails to disclose or suggest Applicant's claims.*

Referring to Fig. 5, Shall et al. discloses a bunker construction that includes cast-in-place footings 10, 12, pre-cast arch elements 18, 20 the tops of which face and abut each other to complete the arch shape, and a cast-in-place crown element 42 atop the abutting upper ends of the arch elements 18, 20.¹⁵ As noted by the Examiner, Shall et al. lacks casting in place a crown sector element between two precast side elements to extend from one side element to the other so that the crown sector element with two side elements form a bridge.¹⁶



To overcome the deficiencies of Shall et al., the Examiner relies on Monachino. However, as carefully pointed out above, Monachino fails to overcome the deficiencies of Shall et al. in that Monachino fails disclose or even suggest casting-in-place a crown sector element as claimed.

(b) *At the time of the invention, one of ordinary skill would not have been motivated by a reasonable consideration of Shall et al. and Monachino to cast-in-place a crown sector element between pre-cast side elements as claimed.*

Both Shall et al. and Monachino disclose forming the top and sides of the arch structure of pre-cast arch elements. For example, Shall et al. describe that the top ends of the arch elements are engaged as shown by Fig. 5 above.¹⁷ The crown sector element 42 of Shall et al. is merely cast-in-place on top of the abutting top ends of the pre-cast arch elements to hold them

¹⁵ Shall et al., col. 2, ln. 46 – col. 3, ln. 26.

¹⁶ June 23, 2005 Office Action, pg. 3.

¹⁷ Shall et al., col. 2, ln. 54-64.

together. The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination.¹⁸ Neither Shall et al. nor Monachino provide any suggestion or motivation for casting in place a crown sector element between two precast arch elements as claimed by claims 25 and 66. Also, there has been no evidence offered to show that one of ordinary skill in the art would have any expectation of success in Applicant's inventive approach.

(c) *Monachino actually teaches away from the claimed invention.*

Monachino expressly states that his arch element is prefabricated.¹⁹ To construct the tunnel section of Monachino, the prefabricated arch element 50 is placed on top of the two opposite piers 32a.²⁰ A tie rod 64 and sealing material 68 are used to clamp and seal the prefabricated arch element 50 in place. Furthermore, the pre-fabricated construction of Monachino fails to realize the advantages of Applicant's hybrid overfilled bridge structure.

All words in a claim must be considered in judging the patentability of that claim against the prior art.²¹ Where the cited art combination lacks an element of the claim, in this case the "casting in place" requirement, the cited art combination fails to make out a *prima facie* case of obviousness.²² Because neither Shall et al. nor Monachino either alone or in combination disclose or fairly suggest at least casting in place a crown sector element as claimed, both claims 25 and 66 are therefore patentable over the cited combination, and dependent claims 29 and 67 are patentable for at least the same reason.

Argument #4: Claims 27, 30, 34, 35 and 40 are not obvious under 35 U.S.C. §103(a) over Shall et al. or Monachino in view of Olsen.

(a) *The Examiner's combination of Shall et al. or Monachino with Olsen in rejecting Applicant's claims is improper because Olsen is not analogous art.*

Each cited reference must meet a two-step test to determine if it is analogous art and therefore properly asserted in an obviousness rejection. The first step is to determine whether the

¹⁸ *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990).

¹⁹ Monachino, col. 7, ln. 30-31 and 61-63.

²⁰ *Id.*

²¹ *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970).

reference is "within the field of the inventor's endeavor."²³ If not, the reference may still be pertinent if it is "reasonably pertinent to the particular problem with which the inventor was involved."²⁴

The inventors define their field of endeavor, by their specification and their claims.²⁵ In this case, the specification begins: "The present invention relates to the general art of geotechnical engineering and to the particular field of overfilled arch structures."²⁶ The claims all begin their preambles: "A method of forming a hybrid arched overfilled bridge structure."

As shown in Fig. 6, Olsen discloses an interlocking block configuration that is built up from blocks of a number of different shapes. The blocks are prefabricated using mold boxes.²⁷ There is no reference in Olsen to overfilled arch structures or methods of forming overfilled arch structures. Thus, Olsen is clearly outside of the field of endeavor in which the inventor was operating.

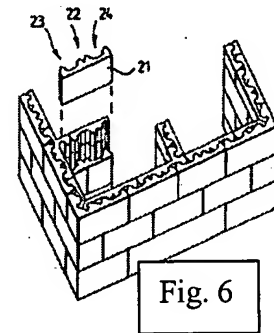


Fig. 6

Moreover, Olsen also fails the second test because it is not a prior art reference which, "because of the matter with which it deals, would have commended itself to an inventor's attention in considering his problem."²⁸ It is improper to define the "problem" broadly, in hindsight, in order to legitimize an improper reference citation.²⁹ A reference directed to a different purpose than the invention would have provided less motivation or occasion to an inventor to consider it.³⁰ Here, Olsen does not address the problem of combining both precasting and casting in place techniques to form a hybrid arch structure, but rather is concerned with manufacturing building blocks from molds and their assembly.

²² *In re Vaack*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

²³ *In re Deminski*, 796 F.2d 436, 230 USPQ 313 (Fed. Cir. 1986).

²⁴ *Id.*

²⁵ *In re Clay*, 966 F.2d 656, 23 USPQ2d 1058 (Fed. Cir. 1992).

²⁶ Specification, pg. 1, ln. 2.

²⁷ Olsen, Fig. 5.

²⁸ *In re Clay* at 656.

²⁹ To illustrate an example of an improperly broad problem formation, Applicant notes that the Court in *In re Clay* held that "[a] person having ordinary skill in the art would not reasonably have expected to solve the problem of dead volume in tanks for storing refined petroleum by considering a reference dealing with plugging underground formation anomalies."

³⁰ *Id.*

(b) Even if Olsen were analogous art, it would not overcome the deficiencies of Shall et al. or Monachino.

As noted by the Examiner, Shall et al. lack casting in place a crown sector element between two precast side elements to extend from one side element to the other so that the crown sector element with two side elements form a bridge.³¹ As noted above, Olsen fails to disclose or even suggest casting in place a crown sector element as claimed, but is instead directed to prefabricating blocks using molds. Although the Examiner did not expressly reject claim 25 under section 103 over Shall et al. in light of Olsen, this is a prerequisite for rejecting dependent claims 27, 30, 34, 35 and 40 over Shall et al. in light of Olsen. However, because Shall et al. and Olsen fail to render claim 25 obvious, then the combination fails to render its dependents obvious.³² Olsen also fails to overcome the deficiencies of Monachino described above.

(c) Even if Olsen were analogous art, at the time of the invention one of ordinary skill would not have been motivated by a reasonable consideration of Monachino or Shall et al. and Olsen to cast-in-place a crown sector element between pre-case side elements as claimed.

Applicants freely stipulate that it was well known to prefabricate components of an arch structure and then assemble the prefabricated components to form the entire arch structure. Notably, however, neither Monachino, Shall et al., nor any of the other cited references had been motivated to combine both precasting and cast-in-place techniques to achieve Applicant's claimed method.

Furthermore, the only teaching that the Examiner has been able to point to for motivation of the combination is Olsen's teaching of a casting table to precast blocks having an intended shape form.³³ There is no indication that Applicant was dealing with any problems associated with precasting or molding of blocks for later assembly. Instead, the Examiner advances as the motivation "to employ a casting table with the intended shaped form and pouring the concrete in the form to form the elements of the bridge in with the intended shape as taught by Olsen."³⁴

³¹ June 23, 2005 Office Action, pg. 3.

³² *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

³³ Olsen, col. 6, ln. 1-25, cited by the Examiner in her Final office action of June 23, 2005, p. 5.

³⁴ June 23, 2003 Final Office Action, pg. 5.

This justification inherently relies on hindsight from Applicant's own teachings,³⁵ and is, in short, simply a restatement of Applicant's solution.³⁶

No evidence of a pre-existing (i.e., non-hindsight) motivation for combining Shall et al. or Monachino and Olsen has been offered by the Examiner, nor is supplied by their teachings. Also, there has been no evidence offered to show that one of ordinary skill in the art would have any expectation of success in Applicant's inventive approach.

Argument #5: Claims 28 and 36 are not obvious under 35 U.S.C. §103(a) over Shall et al. or Monachino in view of Olsen and further in view of Mingolla et al..

(a) *The Examiner's combination of Shall et al. or Monachino with Olsen and Mingolla et al. in rejecting Applicant's claims is improper because Mingolla et al. is not analogous art.*

Mingolla et al. are concerned with formation of bridge decking.³⁷ The bridge decking includes rectangularly shaped, reinforced concrete panels supported on spaced apart rails which are a bridge subdecking formed or I-beams.³⁸ There is no reference in Mingolla et al. to overfilled arch structures or methods of forming overfilled arch structures. Thus, Mingolla et al. is clearly outside of the field of endeavor in which the inventor was operating. Additionally, the teaching of Mingolla et al. is not reasonably pertinent to the particular problem with which the inventor was involved.

(b) *Even if Mingolla et al. were analogous art, it fails to overcome the deficiencies of Shall et al. or Monachino in view of Olsen.*

Mingolla et al. was cited merely as disclosing a casting table and vibrating a concrete mass. However, the casting table of Mingolla et al. is not used to cast in place a crown sector

³⁵ *In re Dembiczak*, 175 F.3d 994, 50 USPQ2d 1614 (Fed. Cir. 1999) ("Close adherence to this methodology [of casting the mind back to the time of the invention] is especially important in the case of less technologically complex inventions, where with the very ease with which the invention can be understood may prompt one 'to fall victim to the insidious effect of a hindsight syndrome wherein that which only the inventor taught is used against its teacher.'")

³⁶ *Monarch Knitting Machinery Corp. v. Fukuhara Industrial Trading Co., Ltd.*, 139 F.3d 1009, 45 USPQ2d 1977 (Fed. Cir. 1998) ("Defining the problem in terms of its solution reveals improper hindsight in the selection of the prior art relevant to obviousness.")

³⁷ Mingolla et al., col. 3, ln. 53-64.

³⁸ *Id.*

element as claimed. Instead, the concrete mass of Mingolla et al. after hardening is "removed from the casting table, turned over, and...brushed."³⁹

(c) Even if Mingolla et al. were analogous art, at the time of the invention one of ordinary skill would not have been motivated by a reasonable consideration of Monachino or Shall et al. and Olsen and Mingolla et al. to cast-in-place a crown sector element between pre-case side elements as claimed.

There is no indication that Applicant was dealing with any problems associated with precasting or molding of bridge decking. No evidence of a pre-existing (i.e., non-hindsight) motivation for combining Shall et al. or Monachino and Olsen and Mingolla et al. has been offered by the Examiner, nor is supplied by their teachings. Also, there has been no evidence offered to show that one of ordinary skill in the art would have any expectation of success in Applicant's inventive approach.

Argument #6: Claim 46 is not obvious under 35 U.S.C. §103(a) over Shall et al. in view of Monachino in view of Davidson.

Davidson fails to overcome the deficiencies of Shall et al. and Monachino.

Davidson was cited merely as disclosing waterproofing side elements and crown sector elements.⁴⁰ Davidson fails to disclose or fairly suggest casting in place a crown sector element as claimed.

(8) Summary

In closing, it is noted that the Final Rejection includes numerous rejections of the claims over various prior art references. However, not a single one of the cited references disclose casting in place a crown sector element between pre-cast side elements as claimed.

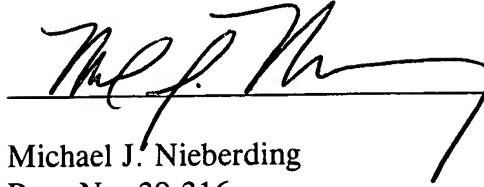
Accordingly, the Applicant respectfully requests the Honorable Board of Patent Appeals and Interferences to reverse the rejections of claims 25, 27-30, 34-41, 45-47 and 66-68 and remand the application with directions to pass the application to allowance.

³⁹ Mingolla et al., col. 5, ln. 61 – col. 6, ln. 3.

⁴⁰ June 23, 2005 Final Office Action, pg. 5.

Serial No. 10/657,375
Attorney Docket No. 27262-182-D1
Appeal Brief

Respectfully submitted,

A handwritten signature in black ink, appearing to read "M. J. Nieberding", is written over a horizontal line.

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APPENDIX - COPY OF CLAIMS INVOLVED IN APPEAL

1-24 (Canceled).

25 (Previously presented). A method of forming a hybrid arched overfilled bridge structure comprising:

- A) defining a first pathway;
- B) defining a second pathway spaced above said first pathway;
- C) providing a plurality of pre-cast side elements;
- D) erecting the pre-cast side elements in two rows along the first pathway to extend toward the second pathway and partially over the first pathway; and
- E) casting in place a crown sector element between two pre-cast side elements to extend from one pre-cast side element of the two pre-cast side elements to the other side element of the two pre-cast side elements so the cast-in-place crown sector combines with the two pre-cast side elements to define a bridge over the first pathway, the cast-in-place crown sector having a surface exposed to the first pathway.

26 (Original). The method of forming a hybrid arched overfilled bridge structure defined in Claim 25 further including providing a casting table for the production of side elements having an arcuate form surface and an adjustable end and a connection element on another end, moving the adjustable end, and pouring concrete mix onto the form surface of the casting table to form an arcuate pre-cast side element.

27 (Original). The method of forming a hybrid arched overfilled bridge structure defined in Claim 25 further including providing a casting table having an arcuate form surface and pouring concrete mix onto the form surface of the casting table to form an arcuate pre-cast side element.

28 (Original). The method of forming a hybrid arched overfilled bridge structure defined in Claim 27 further including moving the form surface of the casting table.

29 (Original). The method of forming a hybrid arched overfilled bridge structure defined in Claim 25 further including using a crown sector form which has a form surface supported by a frame support located between the two pre-cast side elements and pouring concrete mix onto the crown sector form surface.

30 (Original). The method of forming a hybrid arched overfilled bridge structure defined in Claim 29 further including moving the crown sector form surface and the form associated therewith into a desired position.

31 (Original). The method of forming a hybrid arched overfilled bridge structure defined in Claim 30 wherein the step of moving the crown sector form surface and the form support associated therewith includes using hydraulic elements and wheels to move the crown sector form surface and form support.

32 (Original). The method of forming a hybrid arched overfilled bridge structure defined in Claim 26 further including orienting the form surface of the casting table to define tangential angles of the arcuate pre-cast side element formed on the casting table, with the tangential angles such that a gradient of no more than about 20° to 30° is established.

33 (Original). The method of forming a hybrid arched overfilled bridge structure defined in Claim 26 further including orienting the form surface of the casting table to define tangential angles of the arcuate pre-cast side element formed on the casting table, with the tangential angles such that a gradient of more than 30° is established.

34 (Original). The method of forming a hybrid arched overfilled bridge structure defined in Claim 29 further including sealing ends of the crown sector form surface.

35 (Original). The method of forming a hybrid arched overfilled bridge structure defined in Claim 26 further including vibrating the casting table.

36 (Original). The method of forming a hybrid arched overfilled bridge structure defined in Claim 35 further including compacting the concrete mix.

37 (Original). The method of forming a hybrid arched overfilled bridge structure defined in Claim 25 further including forming a structural connection between the cast-in-place crown sector element and two side elements.

38 (Original). The method of forming a hybrid arched overfilled bridge structure defined in Claim 25 further including beveling edges at the crown sector element.

39 (Original). The method of forming a hybrid arched overfilled bridge structure defined in Claim 25 wherein the step of providing side elements includes forming pre-cast side elements in a horizontal orientation and the step of erecting the pre-cast side elements includes lifting the pre-cast side elements in place.

40 (Original). The method of forming a hybrid arched overfilled bridge structure defined in Claim 39 wherein the step of casting in place a crown sector element includes providing a purpose built traveling form and pouring a concrete mix onto the traveling form surface and form support.

41 (Original). The method of forming a hybrid arched overfilled bridge structure defined in Claim 39 wherein the step of casting in place a crown sector element includes forming shrinkage joints in the crown sector element.

42 (Original). The method of forming a hybrid arched overfilled bridge structure defined in Claim 40 further including supporting the pre-cast side elements against the traveling form surface prior to pouring the concrete mix onto the form surface.

43 (Original). The method of forming a hybrid arched overfilled bridge structure defined in Claim 40 further including knocking down the traveling form after the crown sector has been formed and reusing the form.

44 (Original). The method of forming a hybrid arched overfilled bridge structure defined in Claim 28 wherein said step of moving the form surface of the casting table includes orienting the form surface at a first orientation to slope less than a castable concrete gradient, pouring part of the concrete mix, compacting the poured concrete mix, re-orienting the form surface into a second orientation and pouring another part of the concrete mix.

45 (Original). The method of forming a hybrid arched overfilled bridge structure defined in Claim 25 wherein said step of casting in place a crown sector element includes providing reinforcing elements and pouring concrete mix over the reinforcing elements.

46 (Original). The method of forming a hybrid arched overfilled bridge structure defined in Claim 45 further including waterproofing the side elements and the cast-in-place crown sector element.

47 (Original). The method of forming a hybrid arched overfilled bridge structure defined in Claim 46 further including backfilling.

48 (Original). The method of forming a hybrid arched overfilled bridge structure defined in Claim 26 further including heating the side elements while the concrete mix hardens.

49 (Original). The method of forming a hybrid arched overfilled bridge structure defined in Claim 48 further including heating the crown sector element after the crown sector element has been cast in place while the concrete mix hardens.

50 (Original). A method of forming a hybrid arched overfilled bridge structure comprising:

- A) defining a first pathway;
- B) defining a second pathway spaced above said first pathway;
- C) forming a plurality of pre-cast side elements using a casting table;
- D) adjusting the casting table during the formation of a side element;
- E) providing each side element with a connecting element;
- F) placing two footing strips adjacent to the first pathway, with one footing strip on each side of the first pathway;
- G) supporting one end of each of the pre-cast side elements on one of the footing strips;
- H) forming two rows of footing strips along the first pathway . and orienting each pre-cast side element to extend from the footing strip toward the second pathway and partially over the first pathway with the connecting element extending over the first pathway;
- I) placing a crown sector formwork on the footing strips;
- J) adjusting the crown sector formwork;
- K) supporting the pre-cast side elements against the formwork;
- L) pouring a concrete mix onto the crown sector formwork and onto the connecting elements; and
- M) casting in place a crown sector element on the formwork and between the two rows of pre-cast side elements to extend from one pre-cast side element in one row of the two rows of pre-cast side elements to a second pre-cast side element in a second row of the two rows of pre-cast side elements; and
- N) locking the crown sector element to the side elements so the cast-in-place crown sector combines with the pre-cast side elements to define a structure over the first pathway.

51 (Original). A method of forming a hybrid arched overfilled bridge structure comprising:

- A) defining a first pathway;
- B) defining a second pathway spaced above said first pathway;
- C) forming a plurality of arcuate pre-cast side elements using a casting table having an arcuate work surface;
- D) heating a pre-cast side element while it hardens after pouring;
- E) adjusting the casting table during the formation of a side element;

- F) providing each side element with a connecting element;
- G) placing two footing strips adjacent to the first pathway, with one footing strip on each side of the first pathway;
- H) supporting one end of each of the pre-cast side elements on one of the footing strips;
- I) forming two rows of footing strips along the first pathway and orienting each pre-cast side element to extend from the footing strip toward the second pathway and partially over the first pathway with the connecting element extending over the first pathway;
- J) placing a crown sector formwork on the footing strips;
- K) adjusting the crown sector formwork using mechanical elements;
- L) providing reinforcing elements adjacent to the crown sector formwork;
- M) sealing ends of the crown sector form;
- N) supporting the pre-cast side elements against the formwork;
- O) pouring a concrete mix onto the crown sector formwork and onto the connecting elements and onto the reinforcing elements;
- P) casting in place a crown sector element on the formwork and between the two rows of pre-cast side elements to extend from one pre-cast side element in one row of the two rows of pre-cast side elements to a second pre-cast side element in a second row of the two rows of pre-cast side elements;
- Q) heating the concrete mix on the crown sector form during curing;
- R) locking the crown sector element to the side elements so the cast-in-place crown sector combines with the pre-cast side elements to define a bridge over the first pathway;
- S) forming an end treatment at each end of the bridge; and
- T) backfilling around the bridge.

52-65 (Cancelled).

66 (Previously presented). A method of forming a hybrid arched bridge structure over a first pathway, comprising:

- A) providing a plurality of pre-cast side elements;
- B) erecting the pre-cast side elements in two spaced apart rows along the first pathway, each pre-cast side element extending partially over the first pathway; and

- C) casting in place one or more crown sector elements between the two spaced apart rows of pre-cast side elements such that the one or more crown sector elements connect the two spaced apart rows of pre-cast side elements to define a bridge over the first pathway;
- D) wherein at least one of the one or more crown sector elements has a surface exposed to the first pathway.

67 (Previously presented). The method of claim 66 further comprising placing overfill material atop at least a portion of the bridge.

68 (Previously presented). The method of claim 66 wherein multiple crown sector elements are cast in place and each crown sector element extends along the first pathway for a length that connects multiple pre-cast side elements of each row.

69 (Previously presented). A method of forming a hybrid arched overfilled bridge structure comprising:

- A) defining a first pathway;
- B) defining a second pathway spaced above said first pathway;
- C) providing a plurality of pre-cast side elements;
- D) erecting the pre-cast side elements in two rows along the first pathway to extend toward the second pathway and partially over the first pathway;
- E) casting in place a crown sector element between two pre-cast side elements to extend from one pre-cast side element of the two pre-cast side elements to the other side element of the two pre-cast side elements so the cast-in-place crown sector combines with the two pre-cast side elements to define a bridge over the first pathway; and
- F) providing a casting table for the production of side elements having an arcuate form surface and an adjustable end and a connection element on another end, moving the adjustable end, and pouring concrete mix onto the form surface of the casting table to form an arcuate pre-cast side element.

Serial No. 10/657,375
Attorney Docket No. 27262-182-D1
Appeal Brief

EVIDENCE APPENDIX

None submitted.

Serial No. 10/657,375
Attorney Docket No. 27262-182-D1
Appeal Brief

RELATED PROCEEDINGS APPENDIX

No related proceedings.